7181

ecology and environment, inc.

SITE SAFETY PLAN

SF FILE NUMBER Version 988

FILE PLAN 2.0

A. GENERAL INFORMATION

Project Title: RICHARDSON FLAT TAILINGS SITE Project No.: ZT1081 EUT0039SBA

TDD/Pan No.: T08-9204-015

Project Manager: TROY SANDERS Project Dir.: TOM SMITH

Location(s): PARK CITY, UTAH

Prepared by: CORDEL SCHMIDT Date Prepared: 6-11-92

Approval by: RANDY PERLIS Date Approved: 6-11-92

Site Safety Officer Review: CORDEL SCHMIDT Date Reviewed: 6-11-92

Scope/Objective of Work: Drill and install three groundwater monitoring wells by means of a "casing drive drill rig".

Proposed Date of Field Activities: 6-22-92 through 6-26-92

Background Info: Complete: [X] Preliminary (No analytical data available) [ ]

Documentation/Summary:

Overall Chemical Hazard:	Serious [ ]	Moderate [X]
	Low [ ]	Unknown [ ]
Overall Physical Hazard	Serious [ ]	Moderate [X]
	Low [ ]	Unknown [ ]

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

Liquid	[X]	Solid	[X]	Sludge	[ ]	Gas/Vapor	[X]

Characteristic(s):

Flammable/ Ignitable	[X]	Volatile	[X]	Corrosive	[X]	Acutely Toxic	[X]
Explosive	[X]	Reactive	[X]	Carcinogen	[ ]	Radioactive*	[ ]

Other: _____

Physical Hazards:

Overhead	[X]	Confined* Space	[ ]	Below Grade	[ ]	Trip/Fall	[X]
Puncture	[ ]	Burn	[ ]	Cut	[X]	Splash	[X]
Noise	[X]	Other: Drilling rig operations					

*Requires completion of additional form and special approval from the Corporate Health/Safety group. Contact RSC or HQ.

T08-9204-015-004

Site History/Description and Unu l Features (see Sampling Plan for deta. ed description): The Richardson Flat Tailings Site consists primarily of metal ore mill slurries and finely ground waste rock materials in a tailings pile which covers approximately 160 acres of the site. A sanitary landfill is also located within the site boundary.

Locations of Chemicals/Wastes: Wastes are located within the landfill and tailings site, of which the relative perimeter is known.

Estimated Volume of Chemicals/Wastes: Volume is unknown, however the site consists of approximately 160 acres.

Site Currently in Operation Yes: [ ] No: [x]

C. HAZARD EVALUATION

List Hazards by Task (i.e., drum sampling, drilling, etc.) and number them. (Task numbers are cross-referenced in Section D)

Physical Hazard Evaluation: Task #1: Monitoring well installation. Drill rig hazards, monitoring well installation hazards, trip/fall, noise, overhead hazards, heat stress, UV light, Interstate highway traffic and railroad traffic near site.

Chemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold	Odor Description
ARSENIC	.01 mg/m^3	ingest,derm,	vomit,spasims	none	---
LEAD	.05 mg/m^3	ingest,derm,	vomt,diareha	none	---
TCE	50 ppm	ingest,derm,	burn eyes,dizzy	5 ppm	solvent
VINYL CHLORIDE	5 ppm	ingest,contact	dzy,shrt breath	---	sweet
NITRIC ACID	2 ppm	ingest,dermal	eye/skin iritat	unknown	choking
SODIUM HYDROXIDE	2 mg/m^3	ingest,dermal	eye/skin iritat	odorless	---
NAPHTHALENE	10 ppm	ingest,dermal	nausea,headache	.04 ppm	mothballs
PCB	.5 mg/m^3	ingest,dermal	eye,skin,fatigue	---	---
METHANE	dpnd on O2 amt	inhale	asphyxiation	200 ppm (IMPURE)	none-sulfer like

Above contaminants are unconfirmed but are charecteristic of municipal landfills.

Note: Complete and attach a Hazard Evaluation Sheet for major known contaminant.

D. SITE SAFETY WORK PLAN

Site Control: Attach map, use back of this page, or sketch of site showing hot zone, contamination reduction, zone, etc.

Perimeter identified? [X] Site secured? [X]

Work Areas Designated? [X] Zone(s) of Contamination Identified? [X]

Personnel Protection (TLD badges required for all field personnel):

Anticipated Level of Protection (Cross-reference task numbers to Section C):

	A	B	C	D
Task 1			XX	XX
Task 2				
Task 3				
Task 4				
Task 5				
Task 6				

Modifications: IF CONDITIONS WARRENT AN UPGRADE TO LEVEL C THE SITE SAFETY OFFICER WILL DECIDE THE APPROPRIATE ACTION.

Action Levels for Evacuation of Work Zone Pending Reassessment of Conditions:

- Level D: O_2 <19.5% or >25%, explosive atmosphere >10% LEL, organic vapors above background levels, particulates >_____ mg/m^3, other >_____.
- Level C: O_2 <19.5% or >25%, explosive atmosphere >25% LEL_3(California-20%), unknown organic vapor (in breathing zone) >5 ppm, particulates >_____ mg/m^3, other >_____.
- Level B: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors (in breathing zone) >500 ppm, particulates >_____ mg/m^3, other >_____.
- Level A: O_2 <19.5% or >25%, explosive atmosphere >25% LEL (California-20%), unknown organic vapors >500 ppm, particulates >_____ mg/m^3, other >_____.

Air Monitoring (daily calibration unless otherwise noted):

Contaminant of Interest	Type of Sample (area, personal)	Monitoring Equipment	Frequency of Sampling
Volatile organics	Area	OVA	Continuous
Methane	Area	OVA/Explosimetr	Continuous

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc.:

The decontamination process for drilling equipment shall consist of: 1) A high pressure hot water and detergent cleaning and 2) A high pressure hot water rinse. Drilling bits, center rods, and temporary steel casing will also be rinsed with hexane or acetone and then rinsed with clean water. All PPE will be disposed of.

Personnel Decon Protocol: Boots d gloves will be soap water washed anc .p water rinsed. All PPE will be dedicated and disposed of.

Decon Solution Monitoring Procedures, if Applicable: Monitor with HNU or OVA, change as necessary.

Special Site Equipment, Facilities, or Procedures (Sanitary Facilities and Lighting Must Meet 29 CFR 1910.120):

Underground utilities will be identified prior to mobilization onsite. Overhead power lines will be greater than 25 feet from the drill rig.

Site Entry Procedures and Special Considerations: Use usual site entry procedures (i.e. Access points, notify site safety officer when entering/exiting site). Initial site entry will also be made in level D PPE.

Work Limitations (time of day, weather conditions, etc.) and Heat/Cold Stress Requirements:

Drilling operations will occur during daylight hours only. No drilling will be done during thunderstorms or other extreem weather conditions.

General Spill Control, if applicable: Containment and collection.

Investigation-Derived Material Disposal (i.e., expendables, decon waste, cuttings):

Contaminated materials will be containerized and left on site.

Sample Handling Procedures Including Protective Wear:

Tyvek and "surgie" latex gloves will be worn during drilling (level D), if upgrade to level C; saranax, nitrile gloves, and full face respirators outfitted with GMC-H cartridges will be worn.

Team Member*	Responsibility
TROY SANDERS	Team Leader
CORDEL SCHMIDT	Site Safety Officer

*All entries into exclusion zone require Buddy System use. All E & E field staff participate in medical monitoring program and have completed applicable training per 29 CFR 1910.120. Respiratory protection program meets requirements of 29 CFR 1910.134, and ANSI Z88.2 (1980).

E. EMERGENCY INFORMATION

(Use supplemental sheets, if necessary)

LOCAL RESOURCES

(Obtain a local telephone book from your hotel, if possible)

Ambulance 911 or 262-6199

Hospital Emergency Room 350-4630 Holy Cross Hospital 1045 E, 100 S, SLC

Poison Control Center (801)581-2151

Police (include local, county sheriff, state) 911 or 649-9361

Fire Department 911

Airport Salt Lake City International (801)328-8996

Agency Contact (EPA, State, Local USCG, etc.) U.S. E.P.A.- Mike Zimmerman (303)294-7134

Local Laboratory N/A

UPS/Fed. Express 1-800-238-5355

Client/EPA Contact Mike Zimmerman (303) 294-7134

Site Contact

SITE RESOURCES

Site Emergency Evacuation Alarm Method Three blasts on vehicle horn.

Water Supply Source Local Motel

Telephone Location, Number TAT mobile phone 478-3873

Cellular Phone, if available 478-3873

Radio

Other

EMERGENCY CONTACTS

1. Dr. Raymond Harbison (Univ. of Florida) ..... (501) 221-0465 or (904) 462-3277, 3281
   Alachua, Florida (501) 370-8263 (24 hours)

2. Ecology and Environment, Inc., Safety Director
   Paul Jonmaire ..... (716) 684-8060 (office)
   (716) 655-1260 (home)

3. Regional Office Contact ..... (303)755-5231 (home)

   c/o Tom Smith-TATL (303)757-4984 (office)

4. TATOM, or Office Manager (G. Crockett)..... (303)290-9611 (home)

MEDTOX HOTLINE

1. Twenty-four hour answering service: (501) 370-8263

   What to report:

   - State: "this is an emergency."
   - Your name, region, and site.
   - Telephone number to reach you.
   - Your location.
   - Name of person injured or exposed.
   - Nature of emergency.
   - Action taken.

2. A toxicologist, (Drs. Raymond Harbison or associate) will contact you. Repeat the information given to the answering service.

3. If a toxicologist does not return your call within 15 minutes, call the following persons in order until contact is made:

   a. **24 hour hotline - (716) 684-8940**
   b. Corporate Safety Director - Paul Jonmaire - home # (716) 655-1260
   c. Assistant Corp. Safety Officer - Steven Sherman - home # (716) 688-0084

EMERGENCY ROUTES

(NOTE: Field Team must Know Route(s) Prior to Start of Work)

Directions to hospital (include map) West on Interstate 80 to Foothill Blvd. (Route 186), turn right (north) and proceed to 1100 E., turn right (north) and proceed to 100 S., turn left to Holy Cross Hospital, 1045 E., 100 S., Salt Lake City.

Emergency Egress Routes to Get Off-Site Convene to command post for departure from site.

F. EQUIPMENT CHECKLIST

PROTECTIVE GEAR

Level A	No.	Level B	No.
SCBA	>	SCBA	>
SPARE AIR TANKS	>	SPARE AIR TANKS	>
ENCAPSULATING SUIT (Type > _____)	>	PROTECTIVE COVERALL (Type > _____)	>
SURGICAL GLOVES	>	RAIN SUIT	>
NEOPRENE SAFETY BOOTS	>	BUTYL APRON	>
BOOTIES	>	SURGICAL GLOVES	>
GLOVES (Type > _____)	>	GLOVES (Type > _____)	>
OUTER WORK GLOVES	>	OUTER WORK GLOVES	>
HARD HAT	>	NEOPRENE SAFETY BOOTS	>
CASCADE SYSTEM	>	BOOTIES	>
5-MINUTE ESCAPE COOLING VEST	>	HARD HAT WITH FACE SHIELD	>
		CASCADE SYSTEM	>
		MANIFOLD SYSTEM	>
Level C		Level D	
ULTRA-TWIN RESPIRATOR	1 ea	ULTRA-TWIN RESPIRATOR (Available)	
POWER AIR PURIFYING RESPIRATOR		CARTRIDGES (Type _____)	
CARTRIDGES (Type GMC-H)	1 case	5-MINUTE ESCAPE MASK (Available)	
5-MINUTE ESCAPE MASK		PROTECTIVE COVERALL (Type tyvek)	6
PROTECTIVE COVERALL (Type tyvek)	6	RAIN SUIT	4
RAIN SUIT	4	NEOPRENE SAFETY BONDS	
BUTYL APRON		BOOTIES	6 pr
SURGICAL GLOVES	1 box	WORK GLOVES	
GLOVES (Type neoprene)	6 pr	HARD HAT WITH FACE SHIELD	1 ea
OUTER WORK GLOVES		SAFETY GLASSES	1 ea
NEOPRENE SAFETY BOOTS			
HARD HAT WITH FACE SHIELD	1 ea		
BOOTIES	6 pr		
HARDHAT	1 ea		

INSTRUMENTATION	No.	DECON EQUIPMENT	No.
OVA	1	WASH TUBS	2
THERMAL DESORBER		BUCKETS	1
O2/EXPLOSIMETER W/CAL. KIT	1	SCRUB BRUSHES	2
PHOTOVAC TIP		PRESSURIZED SPRAYER	1
HNu (Probe > _____)	1	DETERGENT (Type alconox)	1
MAGNETOMETER		SOLVENT (Type _____)	
PIPE LOCATOR		PLASTIC SHEETING	
WEATHER STATION		TARPS AND POLES	
DRAEGER PUMP, TUBES _____		TRASH BAGS	3
BRUNTON COMPASS		TRASH CANS	
MONITOX CYANIDE		MASKING TAPE	
HEAT STRESS MONITOR		DUCT TAPE	1 roll
NOISE EQUIPMENT > _____		PAPER TOWELS	1 box
PERSONAL SAMPLING PUMPS		FACE MASK	
		FACE MASK SANITIZER	
		FOLDING CHAIRS	
		STEP LADDERS	
RADIATION EQUIPMENT		DISTILLED WATER	
DOCUMENTATION FORMS			
PORTABLE RATEMETER			
SCALER/RATEMETER		**SAMPLING EQUIPMENT**	
NaI Probe		8 OZ. BOTTLES	
ZnS Probe		HALF-GALLON BOTTLES	
GM Pancake Probe		VOA BOTTLES	
GM Side Window Probe		STRING	
MICRO R METER		HAND BAILERS	
ION CHAMBER		THIEVING RODS WITH BULBS	
ALERT DOSIMETER		SPOONS	
POCKET DOSIMETER		KNIVES	
TLD Badge	2	FILTER PAPER	
FIRST AID EQUIPMENT		PERSONAL SAMPLING PUMP SUPPLIES	
FIRST AID KIT	1 kit	Water Level Indicator	1
OXYGEN ADMINISTRATOR			
STRETCHER			
PORTABLE EYE WASH			
BLOOD PRESSURE MONITOR			
FIRE EXTINGUISHER			

VAN EQUIPMENT	No.
TOOL KIT	
HYDRAULIC JACK	
LUG WRENCH	
TOW CHAIN	
VAN CHECK OUT	
Gas	
Oil	
Antifreeze	
Battery	
Windshield Wash	
Tire Pressure	
MISCELLANEOUS	
PITCHER PUMP	
SURVEYOR'S TAPE	
100 FIBERGLASS TAPE	
300 NYLON ROPE	
NYLON STRING	
SURVEYING FLAGS	
FILM	2 roll
Camera, 35mm	1
BUNG WRENCH	
SOIL AUGER	
PICK	
SHOVEL	
CATALYTIC HEATER	
PROPANE GAS	
BANNER TAPE	
SURVEYING METER STICK	
CHAINING PINS & RING	
TABLES	
WEATHER RADIO	
BINOCULARS	
MEGAPHONE	

MISCELLANEOUS (Cont.)	No.
SHIPPING EQUIPMENT	
COOLERS	2
PAINT CANS WITH LIDS, 7 CLIPS EACH	
VERMICULITE	
SHIPPING LABELS	
DOT LABELS: "DANGER"	
"UP"	
"INSIDE CONTAINER COMPLIES ..."	
"HAZARD GROUP"	
STRAPPING TAPE	2 roll
BOTTLE LABELS	
BAGGIES	
CUSTODY SEALS	1 roll
CHAIN-OF-CUSTODY FORMS	
FEDERAL EXPRESS FORMS	
CLEAR PACKING TAPE	

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ON-SITE SAFETY MEETING

Project Richardson Flat TDD No. TO8-9204-015

Date _____ Time _____ PAN No. EUTO039SBA

Address Park City, Utah

Specific Location On site command post

Type of Work Drill and install three groundwater monitoring wells.

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment Minimum protection coveralls, hard hat, steel toe boots, gloves, safety glassess.

Chemical Hazards Specifics unknown. Suspect volatile organics, inorganics, methane gas. Monitor continuously.

Radiation Hazards None suspected.

Physical Hazards Observe drill rig exclusion zone. Be aware of drill rig "kill" switch location.

Emergency Procedures Return to command post (three blasts on vehicle horn).

Hospital/Clinic Holy Cross Hospital Telephone 350-4630

Hospital Address 1045 E., 100 S., Salt Lake City

Special Equipment _____

Other _____

Checklist

1. Emergency information reviewed? _____ and made familiar to all team members? _____
2. Route to nearest hospital driven? _____ and its location known to all team members? _____
3. Site safety plan readily available and its location known to all team members? _____

Meeting shall be attended by all personnel who will be working within the exclusion area. Daily informal update meetings will be held when site tasks and/or conditions change.

ATTENDEES

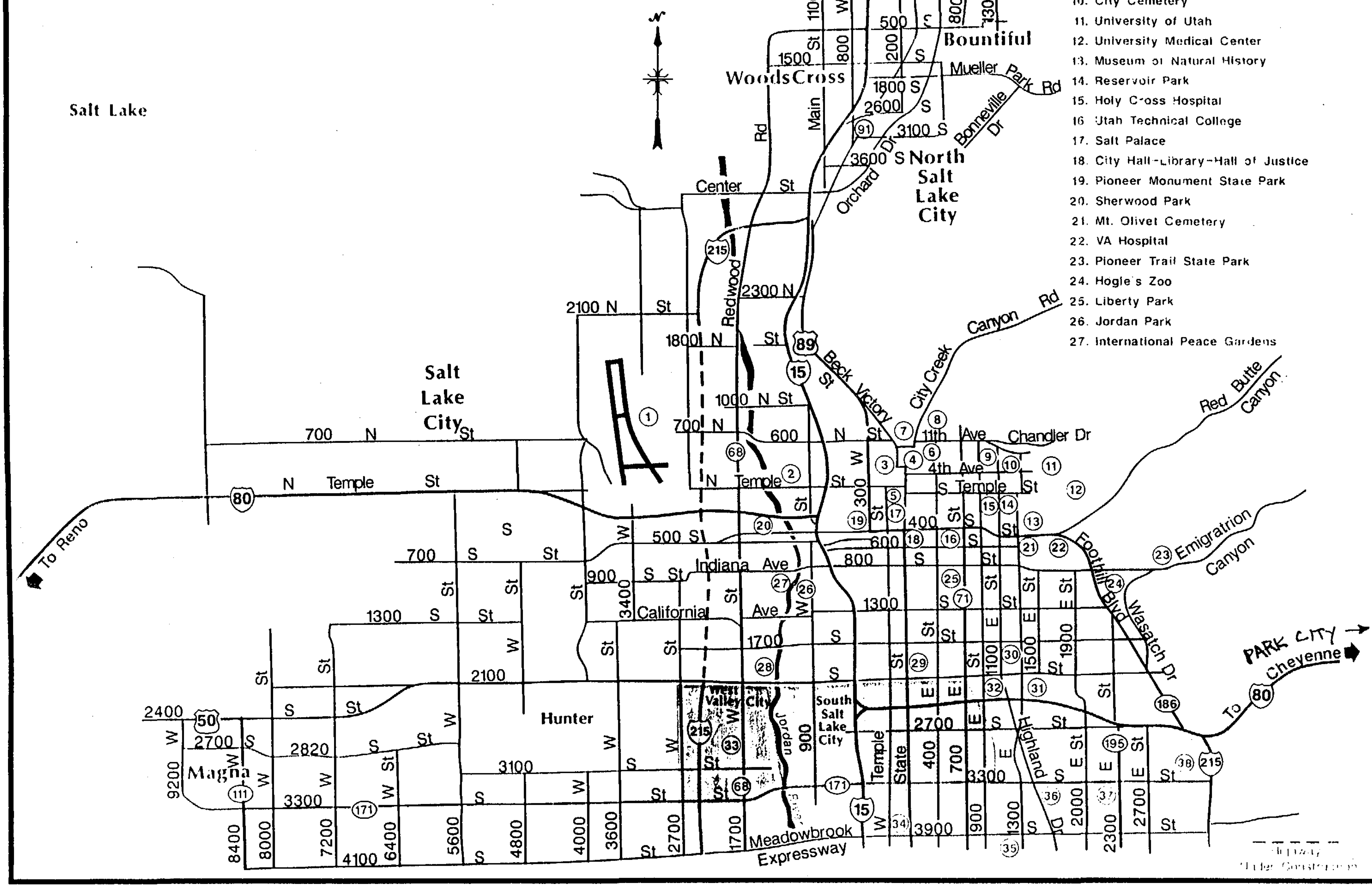
(Expand on back of sheet if necessary)

Name Printed	Signature
Troy Sanders	
Cordel Schmidt	

Meeting Conducted by: _____ (Print) _____ (Signature)

SALT LAKE CITY
UTAH
METROPOLITAN AREA

1. Salt Lake City International Airport
2. State Fair Grounds
3. Pioneer Museum
4. State Capitol
5. Temple Square
6. LDS Hospital
7. Memory Park Grove
8. The Children's Hospital
9. Lindsey Gardens
10. City Cemetery
11. University of Utah
12. University Medical Center
13. Museum of Natural History
14. Reservoir Park
15. Holy Cross Hospital
16. Utah Technical College
17. Salt Palace
18. City Hall-Library-Hall of Justice
19. Pioneer Monument State Park
20. Sherwood Park
21. Mt. Olivet Cemetery
22. VA Hospital
23. Pioneer Trail State Park
24. Hogle's Zoo
25. Liberty Park
26. Jordan Park
27. International Peace Gardens



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Job No | HAZARD EVALUATION OF CHEMICALS | 9/18/90

Chemical Name: ARSENIC Preparation Date 9/9/90

CAS Number: 7440-38-2 DOT Name/UN No. ARSENICAL COMPOUND, SOLID, N.O.S., UN 1557

References Consulted:

XX NIOSH/OSHA Pocket Guide VERSCHUERAN MERCK INDEX HAZARDLINE XX ACGIH TOXIC & HAZARDOUS SAFETY MANUAL
CHRIS SAX Other SAX, ALDRICH

Chemical Properties:

Synonyms:

Chemical Formula As Molecular Weight 74.9

Physical State BLACK SOLID Solubility (H20) INSOL Boiling Point SUBLIM

Flash Point Vapor Press/Density Freezing Point N/A IP G N/A

Odor Characteristic ODORLESS Flammable Limits N/A

Incompatabilities HALOGENS, OXIDIZERS, ZINC, BROMINE, AZIDE, AIR

Biological Properties:

IDLH TLV-TWA 0.2 MG/M3 PEL 10 UG/M3 Odor Threshold

Human ORAL Aquatic Rat/Mouse

Route of Exposure INHALATION, INGESTION, EYE

Carcinogen X Tetatogen Mutagen

Handling Recommendations (Personal Protective Measures):

(100 UG/M3 USE APR;)UG/M3 USE SCBA; VITON, VINYL, NITRILE, NEOPRENE.

Monitoring Recommendations:

Disposal/Waste Treatment:

Health Hazards and First Aid:

GET MEDICAL ATTENTION IMMEDIATELY; REMOVE TO FRESH AIR, ARTIFICIAL RESPIRATION IF NEEDED; FLUSH/ RINSE WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MIN

Symptoms: Acute: ING-STOMACH DISTURBANCES, BURNING/DRY ORAL CAVATIES, VOMITING, SEVERE WEAKNESS, PERFORATION OF NASAL SEPTUM, IRRITATION OF RESPIRATORY TRACT, POSSIBLE SKIN IRRITATION

Chronic: INH-INDUSTRIAL CHRONIC POISIONING, FATIGUE, WEAKNESS, LOSS OF APPETITE, NAUSEAU, DIARRHEA, HORSENESS, UPPER RESP MUCOSA IRRITATION, ADVANCED STAGES SEE NERVE PROBLEMS IN EXTREMITIES, LIVER DAMAGE, LUNG CANCER, SKIN CANCER.

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Job No HAZARD EVALUATION OF CHEMICALS 5/10/90

Chemical Name: LEAD Preparation Dat [illegible]

CAS Number: 7439-92-1 DOT Name/UN No.

References Consulted:

XX NIOSH/OSHA Pocket Guide VERSCHUERAN MERCK INDEX XX HAZARDLINE XX ACGIH TOXIC & HAZARDOUS SAFETY MANUAL XX CHRIS XX SAX Other ALDRICH, RTECS, SITTIG

Chemical Properties:

Synonyms: WHITE LEAD, PLUMBUM

Chemical Formula PB Molecular weight 207

Physical State VARIABLE Solubility (H20) INSOLUBLE Boiling Point 3164 F

Flash Point INCOMBUST Vapor Press/Density VARIABLE Freezing Point SP G 11.3

Odor Characteristic Flammable Limits INCOMBUS

Incompatabilities STRONG OXIDIZERS, PERIOXIDES, ACTIVE METALS

Biological Properties:

IDLH VARIABLE TLV-TWA .15 MG/M3 PEL 50 MG/M3 Odor Threshold NONE

Human Aquatic UNKNOWN Rat/Mouse

Route of Exposure INHALATION, INGESTION, DERMAL CONTACT, EYE(OCULAR) DERMAL ABSORPTIO

Carcinogen INDEF Tetatogen EXP Mutage: INDEF

Handling Recommendations (Personal Protective Measures):

5 MG/M3 HIGH EFFICIENCY PARTICULATE RESPIRATOR, OTHER CONCENTRATIONS - SCBA, AVOID SKIN AND EYE CONTACT

Monitoring Recommendations:

Disposal/Waste Treatment:

TOXIC FUMES OF LEAD

Health Hazards and First Aid:

GIVE WATER, INDUCE VOMITING, MEDICAL ATTENTION IMMED, MOVE TO FRESH AIR, ARTIFICAL RESP IF NECESSARY, MEDICAL ATTENT, EYE/SKIN IRRIGATE/WASH WITH WATER, WASH SKIN THOROUGHLY WITH SOAP & WATER

Symptoms: Acute: CUMULATIVE NEUROTOXIN-COMMONLY OCCURS FROM PROLONGED EXPOSURE, SYMPTMS INCLUDE STOMACH DISTRESS, VOMITING, DIARRHEA, BLACK STOOLS, ANEMIA, NERVOUS SYSTEM EFFECTS

Chronic: 3 CLINICAL TYPES A-AILMENTARY-ABOMINAL PAIN, DISCOMFORT, CONSTIPATION OR DIARRHEA, METALLIC TASTE, LEAD LINE ON GUM, HEADACHE, B-NUEROMUSCULAR, MUSCLE WEAKNESS, JOINT/MUSCLE PAIN, DIZZINESS, INSOMIA, PARALYSIS C-ENCEPHALIC BRAIN INVOLVEMENT, STUPOR, COMA, DEATH, RARE REPRODUCTIVE EFFECTS, HUMAN EPID STUDIES HAVE CONCLUDED THAT LEAD IS A POSION TO MALE & FEMALE GERM CELLS;INCREASED INCIDENCE OF

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Job No | HAZARD EVALUATION OF CHEMICALS | 8/10/90

Chemical Name: TRICHLOROETHYLENE Preparation Date [illegible]87

CAS Number: 79-01-6 DOT Name/UN No.

References Consulted:

XX NIOSH/OSHA Pocket Guide VERSCHUERAN MERCK INDEX HAZARDLINE XX ACGIH [illegible] & HAZARDOUS SAFETY MANUAL

XX CHRIS XX SAX Other ALDRICH, RTECS, SITTIG

Chemical Properties:

Synonyms: ICE, TRICHLOROETHENE, ETHYLENE TRICHLORIDE

Chemical Formula C2HCL3 Molecular weight 131

Physical State LIQUID Solubility (H20) INSOLUBLE Boiling Point 188 F

Flash Point NONE Vapor Press/Density 58 MM Freezing Point -123 F F F [illegible]46

Odor Characteristic [illegible]mmie Limits 8-10.5%

Incompatabilities STRONG CAUSTICS, CHEMICALLY ACTIVEMETALS

Biological Properties:

IDLH TLV-TWA 50 PPM PEL 100 PPM Odor Threshold 50 PPM

Human 160 PPM/83MIN Aquatic 100-10 PPM Rat/Mous[illegible] PPM/4HR

Route of Exposure INHALATION, INGESTION, DERMAL CONTACT, EYE OCULAR

Carcinogen POS ANIM Tetatogen Mutagen [illegible]

Handling Recommendations (Personal Protective Measures):

500 PPM APR W/ORGANIC CARTRIDGE; 1000 PPM-SCBA, EXCEL-VITON; GOOD-NEOPRENE/STYRENE; POO-BUTYL, NEOPRENE, NITRILE

Monitoring Recommendations:

Disposal/Waste Treatment:

Health Hazards and First Aid:

GIVE LARGE AMOUNTS OF WATER, INDUCE VOMITING, MEDICAL ATTENT, REMOVE TO FRESH AIR, CPR [illegible]ESSARY, MEDICAL ATTENT IMMED, IRRIGATE/FLUSH WITH WATER FOR AT LEAST 15 MIN, WASH SKIN THROUGHLY WITH SOAP AN[illegible]TER

Symptoms: Acute: IRRITATION OF NOSE & THROAT, NAUSEA, BLURRED VISION, IRRITATION TO EYE, [illegible]MATITIS

Chronic: LIVER AND/OR KIDNEY DAMAGE, CARDIAC DEGENERATION, CENTRAL NERVOUS SYSTEM [illegible]GENERATION

NITRIC ACID

NAC

Common Synonyms	Watery liquid	Colorless to light brown	Choking odor
	Sinks and mixes with water. Harmful vapor is produced.		

[illegible] protective suit with self-contained breathing apparatus.
[illegible]
[illegible] remove discarded material.
[illegible]

Fire	Not flammable. May cause fire on contact with combustibles. Flammable gas may be formed on contact with metals. Poisonous gases are produced when heated. Wear chemical protective suit with self-contained breathing apparatus. Cool exposed containers with water.
Exposure	CALL FOR MEDICAL AID **VAPOR** Will burn eyes, nose and throat. If inhaled, will cause difficult breathing or loss of consciousness. Move [illegible] to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. **LIQUID** *Will burn skin and eyes.* Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. FOR EYES, hold eyelids open and flush with a [illegible] of water. IF SWALLOWED and victim is conscious, have victim drink water. [illegible] DO NOT INDUCE VOMITING
Water Pollution	HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-corrosive
Restrict access
Evacuate area
Disperse and flush

2. LABEL

2.1 ***Category:*** *Oxidizer; Corrosive*
2.2 **Class:** 5 & 8

3. CHEMICAL DESIGNATIONS

3.1 **CG Compatibility Class:** Nitric acid
3.2 **Formula:** HNO_3-H_2O
3.3 **IMO/UN Designation:** 8.0/2031
3.4 **DOT ID No.:** 2031
3.5 **CAS Registry No.:** 7697-37-2

4. OBSERVABLE CHARACTERISTICS

4.1 **Physical State (as shipped):** Liquid
4.2 **Color:** Colorless
4.3 **Odor:** Acrid; sweet to acrid

5. HEALTH HAZARDS

5.1 **Personal Protective Equipment:** Air mask; rubber acid suit, hood, boots and gloves; chemical goggles; safety shower and eye bath.
5.2 **Symptoms Following Exposure:** Vapors irritate eyes and respiratory tract; lung injury may not become apparent for several hours following exposure. Liquid may cause severe burns to eyes and skin.
5.3 **Treatment of Exposure:** INHALATION: remove to fresh air, administer artificial respiration if required. INGESTION: drink large volumes of water; do NOT induce vomiting. SKIN OR EYES: *flush with water for at least 15 min.*
5.4 **Threshold Limit Value:** 2 ppm
5.5 **Short Term Inhalation Limits:** 15 ppm for 5 min.
5.6 **Toxicity by Ingestion:** Grade 3; LD_{50} = 50 to 500 mg/kg
5.7 **Late Toxicity:** None
5.8 **Vapor (Gas) Irritant Characteristics:** 58-68%; Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations. 95%: Vapors cause severe irritation of eye and throat and can cause eye and lung injury. They cannot be tolerated even at low concentrations.
5.9 **Liquid or Solid Irritant Characteristics:** Severe skin irritant. Causes second and third-degree burns on short contact and is very injurious to the eyes.
5.10 ***Odor Threshold:*** *Data not available*
5.11 **IDLH Value:** 100 ppm

6. FIRE HAZARDS

6.1 **Flash Point:** Not flammable
6.2 **Flammable Limits in Air:** Not flammable
6.3 ***Fire Extinguishing Agents:*** Use water on adjacent fires.
6.4 **Fire Extinguishing Agents Not to be Used:** Not pertinent
6.5 **Special Hazards of Combustion Products:** May give off poisonous oxides of nitrogen and acid fumes when heated in fires.
6.6 **Behavior in Fire:** Decomposes and gives off poisonous oxides of nitrogen.
6.7 **Ignition Temperature:** Not flammable
6.8 ***Electrical Hazard:*** Not pertinent
6.9 **Burning Rate:** Not pertinent
6.10 **Adiabatic Flame Temperature:** Data not available

(Continued)

7. CHEMICAL REACTIVITY

7.1 **Reactivity With Water:** May heat up on mixing, but explosion or formation of steam unlikely.
7.2 **Reactivity with Common Materials:** Very corrosive to wood, paper, cloth and most metals. Toxic red oxides of nitrogen are formed.
7.3 **Stability During Transport:** When heated may give off toxic red oxides of nitrogen.
7.4 **Neutralizing Agents for Acids and Caustics:** Flush with water
7.5 **Polymerization:** Not pertinent
7.6 **Inhibitor of Polymerization:** Not pertinent
7.7 **Molar Ratio (Reactant to Product):** Data not available
7.8 **Reactivity Group:** 3

8. WATER POLLUTION

8.1 **Aquatic Toxicity:** 72 ppm/96 hr/mosquito fish/TL_m/fresh water
330-1000 ppm/48 hr/cockle/LC_{50}/salt water
8.2 **Waterfowl Toxicity:** Data not available
8.3 **Biological Oxygen Demand (BOD):** None
8.4 **Food Chain Concentration Potential:** None

9. SHIPPING INFORMATION

9.1 **Grades of Purity:** Various grades: 52-98%
9.2 **Storage Temperature:** Ambient
9.3 **Inert Atmosphere:** No requirement
9.4 **Venting:** Open or pressure-vacuum

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

A-P

11. HAZARD CLASSIFICATIONS

11.1 **Code of Federal Regulations:** Oxidizer
11.2 **NAS Hazard Rating for Bulk Water Transportation:**

Category	Rating
Fire	0
Health	
Vapor Irritant	3
Liquid or Solid Irritant	4
Poisons	3
Water Pollution	
Human Toxicity	3
Aquatic Toxicity	3
Aesthetic Effect	2
Reactivity	
Other Chemicals	4
Water	0
Self Reaction	0

11.3 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue)	3
Flammability (Red)	0
Reactivity (Yellow)	0
	oxy

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 **Physical State at 15°C and 1 atm:** Liquid
12.2 **Molecular Weight:** Not pertinent
12.3 **Boiling Point at 1 atm:** 192.0°F = 88.9°C = 362.1°K
12.4 **Freezing Point:** —50°F = —45.6°C = 227.6°K
12.5 **Critical Temperature:** Not pertinent
12.6 ***Critical Pressure:*** *Not pertinent*
12.7 **Specific Gravity:** 1.49 at 20°C (liquid)
12.8 **Liquid Surface Tension:** Not pertinent
12.9 **Liquid Water Interfacial Tension:** Not pertinent
12.10 **Vapor (Gas) Specific Gravity:** Not pertinent
12.11 **Ratio of Specific Heats of Vapor (Gas):** (est.) 1.248
12.12 **Latent Heat of Vaporization:** *214 Btu/lb = 119 cal/g =* 4.98×10^5 J/kg
12.13 **Heat of Combustion:** Not pertinent
12.14 **Heat of Decomposition:** Not pertinent
12.15 **Heat of Solution:** —205 Btu/lb = —114 cal/g = -4.76×10^5 J/kg
12.16 **Heat of Polymerization:** Not pertinent
12.25 **Heat of Fusion:** Data not available
12.26 **Limiting Value:** Data not available
12.27 **Reid Vapor Pressure:** 1.9 psia

6. FIRE HAZARDS (Continued)

6.11 **Stoichiometric Air to Fuel Ratio:** Data not available
6.12 **Flame Temperature:** Data not available

SODIUM HYDROXIDE

SHD

Common Synonyms	Solid flakes or pellets White Odorless
Caustic soda Lye	Sinks and mixes with water.

- Avoid contact with solid and dust. Keep people away.
- Wear rubber overclothing (including gloves).
- Do not discharge if possible.
- Isolate and remove discharged material.
- Notify local health and pollution control agencies.

Fire

Not flammable.
May cause fire on contact with combustibles.
Flammable gas may be produced on contact with metals.
Wear rubber overclothing (including gloves).
Flood discharge area with water.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID.

DUST
Irritating to eyes, nose and throat.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.
IF IN EYES, hold eyelids open and flush with plenty of water.

SOLID
Will burn skin and eyes.
Harmful if swallowed.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water (2 glasses).
DO NOT INDUCE VOMITING.

Water Pollution

Dangerous to aquatic life in high concentrations.
May be dangerous if it enters water intakes.

Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-corrosive
Restrict access
Disperse and flush

2. LABEL

2.1 Category: Corrosive
2.2 Class: 8

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Not listed
3.2 Formula: NaOH
3.3 IMO/UN Designation: 8.0/1823
3.4 DOT ID No.: 1823
3.5 CAS Registry No.: 1310-73-2

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Solid
4.2 Color: White
4.3 Odor: Odorless

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Chemical safety goggles; face shield; filter or dust-type respirator; rubber boots; rubber gloves.

5.2 Symptoms Following Exposure: Strong corrosive action on contacted tissues. INHALATION: dust may cause damage to upper respiratory tract and lung itself, producing from mild nose irritation to pneumonitis. INGESTION: severe damage to mucous membranes; severe scar formation or perforation may occur. EYE CONTACT: produces severe damage.

5.3 Treatment of Exposure: INHALATION: remove from exposure; support respiration; call physician. INGESTION: give water or milk followed by dilute vinegar or fruit juice; do NOT induce vomiting. SKIN: wash immediately with large quantities of water under emergency safety shower while removing clothing; continue washing until medical help arrives; call physician. EYES: irrigate immediately with copious amounts of water for at least 15 min.; call physician.

5.4 Threshold Limit Value: 2 mg/m³

5.5 Short Term Inhalation Limits: Not pertinent

5.6 Toxicity by Ingestion: (10% solution) oral rabbit LD_{Lo} = 500 mg/kg

5.7 Late Toxicity: None

5.8 Vapor (Gas) Irritant Characteristics: Non-volatile

5.9 Liquid or Solid Irritant Characteristics: Severe skin irritant. Causes second-and third-degree burns on short contact and is very injurious to the eyes.

5.10 Odor Threshold: Not pertinent

5.11 IDLH Value: 200 mg/m³

6. FIRE HAZARDS

6.1 Flash Point: Not flammable
6.2 Flammable Limits in Air: Not flammable
6.3 Fire Extinguishing Agents: Not pertinent
6.4 Fire Extinguishing Agents Not to be Used: Not pertinent
6.5 Special Hazards of Combustion Products: Not pertinent
6.6 Behavior in Fire: Not pertinent
6.7 Ignition Temperature: Not flammable
6.8 Electrical Hazard: Not pertinent
6.9 Burning Rate: Not flammable
6.10 Adiabatic Flame Temperature: Data not available
6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: Dissolves with liberation of much heat; may steam and splatter
7.2 Reactivity with Common Materials: When wet, attacks metals such as aluminum, tin, lead, and zinc to produce flammable hydrogen gas.
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Flush with water, rinse with dilute acetic acid
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Molar Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: Data not available

8. WATER POLLUTION

8.1 Aquatic Toxicity: 125 ppm/96 hr/mosquito fish/TL_m/fresh
180 ppm/23 hr/oysters/lethal/salt water
8.2 Waterfowl Toxicity: Data not available
8.3 Biological Oxygen Demand (BOD): None
8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

9.1 Grades of Purity: Technical flakes; USP pellets
9.2 Storage Temperature: Ambient
9.3 Inert Atmosphere: No requirement
9.4 Venting: Open

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

SS

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Corrosive material
11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed
11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	3
Flammability (Red)	0
Reactivity (Yellow)	1

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Solid
12.2 Molecular Weight: 40.00
12.3 Boiling Point at 1 atm: Very high
12.4 Freezing Point: 604°F = 318°C = 591°K
12.5 Critical Temperature: Not pertinent
12.6 Critical Pressure: Not pertinent
12.7 Specific Gravity: 2.13 at 20°C (solid)
12.8 Liquid Surface Tension: Not pertinent
12.9 Liquid Water Interfacial Tension: Not pertinent
12.10 Vapor (Gas) Specific Gravity: Not pertinent
12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent
12.12 Latent Heat of Vaporization: Not pertinent
12.13 Heat of Combustion: Not pertinent
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.25 Heat of Fusion: 50.0 cal/g
12.26 Limiting Value: Data not available
12.27 Reid Vapor Pressure: Data not available

NOTES

JUNE 1985

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ecology and environment, inc.

Job No | HAZARD EVALUATION OF CHEMICALS | 3/10/90

Chemical Name: NAPHTHALENE Preparation Date: 1-23-90

CAS Number: 91-20-3 DOT Name/UN No.

References Consulted:

XX NIOSH/OSHA Pocket Guide VERSCHUERAN MERCK INDEX XX HAZARDLINE XX ACGIH [illegible] & HAZARDOUS SAFETY MANUAL

XX CHRIS XX SAX Other ALDRICH, SITTIG

Chemical Properties:

Synonyms: NAPTHALIN, MOTH BALL, WHITE TAR

Chemical Formula $C_{10}H_8$ Molecular weight

Physical State SOLID FLAKES Solubility (H20) INSOLUBLE Boiling Point 424 F

Flash Point 174 F Vapor Press/Density @5 MM Freezing Point 177 F [illegible] 3625

Odor Characteristic [illegible]mable Limits @9-59%

Incompatabilities STRONG OXIDIZERS, CHRONIC ANHYDRIDE

Biological Properties:

IDLH TLV-TWA 10 PPM PEL 10 PPM Odor Threshold 3 PPM

Human Aquatic 10-1 PPM Rat/Mous

Route of Exposure INHALATION, INGESTION, DERMAL CONTACT, EYE OCULAR, DERMAL ABSORPTIO

Carcinogen N/A Tetatogen Mutage[illegible]

Handling Recommendations (Personal Protective Measures):

500 PPM USE APR W/CHEMICAL CARTRIDGE; 500 PPM-SCBA, EXCEL-VITON;POOR-BUTYL, VINYL, NEOPRENE, NITRILE, PREVENT REPEATED/PROLONGED EXPOSURES

Monitoring Recommendations:

Disposal/Waste Treatment:

Health Hazards and First Aid:

GET MEDICAL ATTENT IMMED, GIVE WATER & INDUCE VOMITING, MOVE TO FRESH AIR, CPR IF NECESSARY, MEDICAL ATTENT IMMED, IRRIGATE/RINSE WITH WATER FOR AT LEAST 15 MIN, WASH SKIN THROUGHLY WITH SOAP & WATER

Symptoms: Acute: SKIN SENSITIZER & BLOOD AGENT, EYE IRRITATION, HEADACHE, CONFUSION, [illegible]NAL PAIN, NAUSEA, VOMITING, DIARRHEA, BLADDER, IRRITATION, HEMOLYTIC EFFECTS (DESTRUCTION OF RE[illegible]D CELLS) MOSTLY PRONOUNCED IN INDIVIDUALS W/HEREDITARY DEFICIENCY OF GLUCOSE-6-DEHYDROGENASE

Chronic: REPEATED EXPOSURE MAY CAUSE DERMATITIS, KIDNEY AND/OR LIVER DAMAGE, [illegible]ED EXPOSURE MAY LEAD TO CATARACTS

ecology and environment, inc.

Job No | HAZARD EVALUATION OF CHEMICALS | 8/10/90

Chemical Name: POLYCHLORINATED BIPHENYL Preparation Dat -23-90

CAS Number: 53469-21-9 DOT Name/UN No.

References Consulted:

XX NIOSH/OSHA Pocket Guide VERSCHUERAN MERCK INDEX HAZARDLINE XX ACGIH [illegible] & HAZARDOUS SAFETY MANUAL

XX CHRIS XX SAX Other RTECS

Chemical Properties:

Synonyms: AROCHLOR 1242/42% CHLORINE, CHLORODIPHENYL PCB

Chemical Formula C12H7C13 Molecular weight 258

Physical State DARK LIQUID Solubility (H20) INSOLUBLE Boiling Point 617-691

Flash Point 349 F Vapor Press/Density 001 MM Freezing Point -2 F [illegible] 1.3

Odor Characteristic [illegible]ble Limits UNKNOWN

Incompatabilities STRONG OXIDIZERS

Biological Properties:

IDLH TLV-TWA 1 MG/M3 PEL 1 MG/M3 Odor Threshold

Human 10 MG/M3 Aquatic 278 PPM Rat/Mouse

Route of Exposure INHALATION, INGESTION, DERMAL CONTACT EYE OCULAR, DERMAL ABSORPTION

Carcinogen SUS-HUM Tetatogen Mutage [illegible]-POS

Handling Recommendations (Personal Protective Measures):

ANY DETECTABLE LIMIT - SCBA, EXCEL-VITON;GOOD-BUTYL, VINYL, NITRILE; POOR-NEOPRENE, SAFETY GOGGLES, CLOTHING TO AVOID CONTACT

Monitoring Recommendations:

Disposal/Waste Treatment:

Health Hazards and First Aid:

MEDICAL ATTEN IMMED, GIVE SALT WATER, INDUCE VOMITING, MOVE TO FRESH AIR, ARTIFICAL RES IF NECESSARY, MEDICAL ATTEN, IRRIGATE/RINSE IMMED WITH WATER, WASH SKIN THROUGHLY WITH SOAP & WATER

Symptoms: Acute: IRRITATION OF EYES, NOSE, THROAT, CAN CAUSE VOMITING, EDEMA, ANOREXIA, NAUSEA, ABDOMINAL PAIN, FATIGUE

Chronic: CHLORACNE FROM PROLONGED SKIN CONTACT, ACUTE & CHRONIC EXPOSURE MAY CAUSE LIVER DAMAGE OR CANCER

METHANE

MTH

Common Synonyms	Gas	Colorless	Weak odor
Marsh gas Natural gas	Liquid floats and boils on water. Flammable visible vapor cloud is produced.		

- Stop discharge if possible. Keep people away.
- Shut off ignition sources and call fire department.
- Use dikes and use water spray to knock down vapor.
- Evacuate area in case of large discharge.
- Avoid contact with liquid and vapor.
- Notify local health and pollution control agencies.

Fire

FLAMMABLE.
Flashback along vapor trail may occur.
May explode if ignited in an enclosed area.
Stop discharge if possible.
Cool exposed containers and protect men effecting shutoff with water.
Let fire burn.

Exposure

CALL FOR MEDICAL AID

VAPOR
Not irritating to eyes, nose or throat.
If inhaled, will cause dizziness, difficult breathing, and loss of consciousness.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
Will cause frostbite.
Flush affected areas with plenty of water.
DO NOT RUB AFFECTED AREAS.

Water Pollution

Not harmful to aquatic life.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

Issue warning-high flammability
Restrict access
Evacuate area

2. LABEL

2.1 Category: Flammable gas
2.2 Class: 2

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Paraffin
3.2 Formula: CH_4
3.3 IMO/UN Designation: 2.0/1971
3.4 DOT ID No.: 1971
3.5 CAS Registry No.: 74-82-8

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Liquefied gas
4.2 Color: Colorless
4.3 Odor: Mild, sweet

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Self-contained breathing apparatus for high concentrations; protective clothing if exposed to liquid.
5.2 Symptoms Following Exposure: High concentrations may cause asphyxiation. No systemic effects, even at 5% concentration in air.
5.3 Treatment of Exposure: Remove to fresh air. Support respiration.
5.4 Threshold Limit Value: Not pertinent (methane is an asphyxiant, and limiting factor is available oxygen)
5.5 Short Term Inhalation Limits: *Data not available*
5.6 Toxicity by Ingestion: Not pertinent
5.7 Late Toxicity: None
5.8 Vapor (Gas) Irritant Characteristics: Vapors are nonirritating to the eyes and throat.
5.9 Liquid or Solid Irritant Characteristics: No appreciable hazard. Practically harmless to the skin, because it evaporates quickly, but may cause some frostbite.
5.10 Odor Threshold: 200 ppm
5.11 IDLH Value: Data not available

6. FIRE HAZARDS

6.1 Flash Point: Flammable gas
6.2 Flammable Limits in Air: 5.0%-15.0%
6.3 Fire Extinguishing Agents: Stop flow of gas
6.4 Fire Extinguishing Agents Not to be Used: Water
6.5 Special Hazards of Combustion Products: None
6.6 Behavior in Fire: Not pertinent
6.7 Ignition Temperature: 1004°F
6.8 Electrical Hazard: Class I, Group D
6.9 Burning Rate: 12.5 mm/min.
6.10 Adiabatic Flame Temperature: *2339. (Est.)*
6.11 Stoichiometric Air to Fuel Ratio: 17.16 (Est.)
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
7.2 Reactivity with Common Materials: No reaction
7.3 Stability During Transport: Stable
7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
7.5 Polymerization: Not pertinent
7.6 Inhibitor of Polymerization: Not pertinent
7.7 Molar Ratio (Reactant to Product): Data not available
7.8 Reactivity Group: 31

8. WATER POLLUTION

8.1 Aquatic Toxicity: None
8.2 Waterfowl Toxicity: None
8.3 Biological Oxygen Demand (BOD): None
8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

9.1 Grades of Purity: Research grade; pure grade
9.2 Storage Temperature: -260°F
9.3 Inert Atmosphere: No requirement
9.4 Venting: Safety relief

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)

A-B-C-D-E-F-G

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Flammable gas
11.2 NAS Hazard Rating for Bulk Water Transportation:

Category	Rating
Fire	4
Health	
Vapor Irritant	0
Liquid or Solid Irritant	0
Poisons	0
Water Pollution	
Human Toxicity	0
Aquatic Toxicity	0
Aesthetic Effect	0
Reactivity	
Other Chemicals	0
Water	0
Self Reaction	0

11.3 NFPA Hazard Classification:

Category	*Classification*
Health Hazard (Blue)	1
Flammability (Red)	4
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Gas
12.2 Molecular Weight: 16.04
12.3 Boiling Point at 1 atm: −258.7°F = −161.5°C = 111.7°K
12.4 Freezing Point: −296.5°F = −182.5°C = 90.7°K
12.5 Critical Temperature: −116.5°F = −82.5°C = 190.7°K
12.6 Critical Pressure: 668 psia = 45.44 atm = 4.60 MN/m²
12.7 Specific Gravity: 0.422 at −160°C (liquid)
12.8 Liquid Surface Tension: 14 dynes/cm = 0.014 N/m at −161°C
12.9 Liquid Water Interfacial Tension: (est.) 50 dynes/cm = 0.050 N/m at −161°C
12.10 Vapor (Gas) Specific Gravity: 0.55 1.0
12.11 Ratio of Specific Heats of Vapor (Gas): 1.306
12.12 Latent Heat of Vaporization: 219.4 Btu/lb = 121.9 cal/g = 5.100 X 10^3 J/kg
12.13 Heat of Combustion: −21,517 Btu/lb = −11,954 cal/g = −500.2 X 10^3 J/kg
12.14 Heat of Decomposition: Not pertinent
12.15 Heat of Solution: Not pertinent
12.16 Heat of Polymerization: Not pertinent
12.25 Heat of Fusion: 13.96 cal/g
12.26 ***Limiting Value:*** *Data not available*
12.27 Reid Vapor Pressure: Very high

NOTES

SCAN 18–1 HEAT-RELATED EMERGENCIES

Condition	*Muscle Cramps*	*Breathing*	*Pulse*	*Weakness*	*Skin*	*Perspiration*	*Loss of Consciousness*
Heat cramps	Yes	Varies	Varies	Yes	Moist-warm No change	Heavy	Seldom
Heat exhaustion	No	Rapid Shallow	Weak	Yes	Cold Clammy	Heavy	Sometimes
Heat-stroke	No	Deep, then shallow	Full Rapid	Yes	Dry-hot	Little or none	Often

1 HEAT CRAMPS

SYMPTOMS AND SIGNS:
Severe muscle cramps (usually in the legs and abdomen), exhaustion, sometimes dizziness or periods of faintness.

EMERGENCY CARE PROCEDURES:
- Move patient to a nearby cool place
- Give patient salted water to drink or half-strength commercial electrolyte fluids
- Massage the "cramped" muscle to help ease the patient's discomfort, massaging with pressure will be more effective than light rubbing actions. (Optional in some EMS systems).
- Apply moist towels to the patient's forehead and over cramped muscles for added relief
- If cramps persist, or if more serious signs and symptoms develop, ready the patient and transport

2 HEAT EXHAUSTION

SYMPTOMS AND SIGNS:
Rapid and shallow breathing, weak pulse, cold and clammy skin, heavy perspiration, total body weakness, and dizziness that sometimes leads to unconsciousness.

EMERGENCY CARE PROCEDURES:
- Move the patient to a nearby cool place.
- Keep the patient at rest.
- Remove enough clothing to cool the patient without chilling him (watch for shivering)
- Fan the patient's skin.
- Give the patient salted water or half-strength commercial electrolyte fluids. Do not try to administer fluids to an unconscious patient.
- Treat for shock, but do not cover to the point of overheating the patient.
- Provide oxygen if needed
- If unconscious, fails to recover rapidly, has other injuries, or has a history of medical problems, transport as soon as possible.

3 HEATSTROKE

SYMPTOMS AND SIGNS:
Deep breaths, then shallow breathing; rapid strong pulse, then rapid, weak pulse; dry, hot skin; dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching may be seen.

EMERGENCY CARE PROCEDURES:
- Cool the patient—in any manner—rapidly, move the patient out of the sun or away from the heat source. Remove patient's clothing and wrap him in wet towels and sheets. Pour cool water over these wrappings. Body heat must be lowered rapidly or brain cells will die!
- Treat for shock and administer a high concentration of oxygen.
- If cold packs or ice bags are available, wrap them and place one bag or pack under each of the patients armpits, one behind each knee, one in the groin, one on each wrist and ankle, and one on each side of the patient's neck.
- Transport as soon as possible.
- Should transport be delayed, find a tub or container—immerse patient up to the face in cooled water. Constantly monitor to prevent drowning.
- Monitor vital signs throughout process.